REMARKS

Claims 1-30 are pending in the application. Claims 1, 6, 10, 11, 12, 20, and 27 are independent, and claims 2-5, 7-9, 13-19, 21-26, and 28-30 are dependent. The Specification has been amended. Claims 6, 14, 20-21, and 24-26 have been amended. Based on the foregoing Amendment and the following Remarks, Applicant respectfully requests that the Examiner reconsider and withdraw all rejections and pass claims 1-30 to allowance.

Objection to the Specification

In paragraph 3, the Examiner objected to the Specification. Specifically, the Examiner requested/required Applicants to provide serial numbers for U.S. Patent Applications cited in the Specification. Applicants have amended the Specification to accommodate the Examiner's request/requirement. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the objections.

Rejection of Claims 6-9 and 11 Under 35 U.S.C. § 112, Second Paragraph

In the paragraph 4, the Examiner rejected claims 6-9 and 11 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter the Applicants regard as the invention. Applicants respectfully traverse the rejection.

The essential inquiry into a rejection under 35 U.S.C. § 112, second paragraph, indefiniteness rejection is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. M.P.E.P. § 2173.02 citing *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000). Definiteness of claim language must be analyzed, not in a vacuum, but in light of: a) the application disclosure, b) the teachings of the prior art, and c) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. *Id.* In reviewing a claim for definiteness, the Examiner must consider the claim as a

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whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. § 112, second paragraph. *Id.*

With regard to **claim 6**, the Examiner states that the phrase "mechanism" renders the claim indefinite because it is unclear how the tuning mechanism is configured. Applicants respectfully disagree. Applicants respectfully direct the Examiner's attention to paragraphs **0042-0044** of Applicant's Specification. This portion of the Specification describes in detail how a wavelength tuning mechanism is configured to select a transmission wavelength according to a wavelength selection signal according to at least one embodiment of the present invention. The claim language read in conjunction with these teachings of the disclosure and of the prior art apprises with reasonable clarity and particularity, to one of ordinary skill in the art, the scope of claim 6. Accordingly, Applicants submit claim 6 is patentable and respectfully request that the Examiner reconsider and withdraw the rejection. Claims 7-9 properly depend from patentable claim 6 and therefore are patentable as well. Accordingly, the Applicants respectfully request that the Examiner reconsider and withdraw the rejection.

With regard to **claim 11**, the Examiner states that the phrase "uncoupled" renders the claim indefinite because it is unclear how the tuning assembly is operable uncoupled from the external cavity optical path length tuning assembly. Applicants respectfully disagree. Applicants respectfully direct the Examiner's attention to paragraphs **0060-0063** of Applicant's Specification. This portion of the Specification describes in detail how a wavelength tuning assembly may be operable uncoupled from the external cavity optical path length tuning assembly according to at least one embodiment of the present invention. The claim language read in conjunction with these teachings of the disclosure and of the prior art apprises with reasonable clarity and particularity, to one of ordinary skill in the art, the scope of claim 11. Accordingly, Applicants submit claim 11 is patentable and respectfully request that the Examiner reconsider and withdraw the rejection. Accordingly, the Applicants respectfully request that the Examiner reconsider and withdraw the rejection.

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Objection to the Drawings

In paragraph 5, the Examiner objected to the drawings. In particular, the Examiner noted that the figures fail to show a wavelength tuning assembly **operable uncoupled** from said external cavity optical path length tuning assembly as required by M.P.E.P. §608.02(d). Applicants respectfully disagree. Applicants respectfully direct the Examiner's attention to **Figure 5** and paragraphs **0060-0063** of Applicant's Specification, which describe in detail how a wavelength tuning assembly may be operable uncoupled from the external cavity optical path length tuning assembly according to at least one embodiment of the present invention. *See*, for example, the grating **60** and actuators **62, 64**. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the objections.

Rejection of the Claims 1-2 Under 35 U.S.C. § 102(e)

In the Office Action, the Examiner rejected claims 1-30 under 35 U.S.C. § 102(e) as being anticipated by U.S. Publication No. US 2002/0126345 9 to Green et al. (hereinafter "Green") or U.S. Patent No. 6, 282,215 to Zorabedian et al. (hereinafter "Zorabedian"). Applicants respectfully traverse the rejection.

A claim is anticipated only if each and every element of the claim is found in a single reference either expressly or inherently. (M.P.E.P. § 2131 *citing Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628 (Fed. Cir. 1987)). When each element cannot be found in a single reference the Examiner may show that a characteristic not disclosed in the reference is inherent using a second reference. (M.P.E.P. § 2131.01 III.) The missing element must be necessarily present in the teaching and that persons of ordinary skill would recognize it as so. (Id. *citing Continetal Can Co. USA v. Monsanto Co*, 948 F.2d 1264, 1268 (Fed. Cir. 1991).) Applicants respectfully traverse the rejections.

Regarding claims 1-11 and 27-30, the Examiner makes the following assertions:

(1) Green and Zorabedian each teaches that a channel selector tuner and an external cavity tuner are independently operable with respect to each other; and

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(2) Zorabedian inherently discloses a wavelength tuning element configured to tune orthogonally with respect to an external cavity mode tuning element.

As for the Examiner's assertion that Green teaches that a channel selector tuner and an external cavity tuner are ***independently operable*** with respect to each other, Applicants respectfully disagree. Applicants respectfully submit that Green teaches a tunable laser wherein the tuning element is a grating that is pivotally adjusted to tune an external cavity. (*See*, "**[0038]** Channel selection ... is brought about by changes in the optical path length 256 of the channel selector.... **[0049]** The channel selector may be implemented with a diffraction element and a rotary actuator to vary the angle at which the grating intersects the optical path. Tuning is accomplished by varying the angle of incidence of the beam on the surface of the grating." This means that in Green, contrary to the Examiner's assertion, the channel selector tuner and the external cavity tuner are ***dependently operable*** with respect to each other.

Likewise, as for the Examiner's assertion that Zorabedian teaches that a channel selector tuner and an external cavity tuner are ***independently operable*** with respect to each other, Applicants respectfully disagree. Applicants respectfully submit that Zorabedian teaches a tunable laser where the cavity length is synchronously changed with the wavelength tuning mechanism to keep the laser operating in the same longitudinal mode while tuning. (*See*, for example, column 6, lines 28-33 "cascading the corrective element 120, e.g., glass wedge, with the wedged interference filter/etalon 162 to vary the path length of the cavity in synchronism with the filtered wavelength, a constant mode number is maintained in the cavity during the tuning of the laser.) This means that in Zorabedian, contrary to the Examiner's assertion, the channel selector tuner and the external cavity tuner are ***synchronously operable*** with respect to each other.

The same is true for the Examiner's assertions that Zorabedian inherently discloses a wavelength tuning element configured to tune orthogonally with respect to an external cavity mode tuning element. That is, it follows that if a channel selector tuner and an external cavity

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tuner are configured to be ***synchronously operable*** with respect to each other, then, by definition, a person of ordinary skill in the relevant art would determine that it is ***not inherent*** in Zorabedian that they are configured ***to tune orthogonally*** with respect to each other.

Accordingly, Applicants submit that the rejection to claims 1, 6, 10, 11, and 27 have been properly traversed and respectfully request that the Examiner reconsider and withdraw the rejection. Claims 2-5, 7-9, and 28-30 properly depend from patentable claims and therefore are patentable as well. Accordingly, the Applicants respectfully request that the Examiner reconsider and withdraw the rejection.

As for claims 12-19, the Examiner again asserts among other things that Green and Zorabedian each teaches a wavelength tuning assembly configured to operate independently from a cavity optical path length tuning assembly. Applicants respectfully disagree. As discussed above, in Zorabedian, all wavelength tuning and external cavity tuner are ***synchronously operable*** with respect to each other and in Green, all wavelength tuning and external cavity tuner are ***dependently operable*** with respect to each other, which is contrary to being ***independently operable*** with respect to each other. Accordingly, Applicants submit that the rejection to claims 12-19 have been properly traversed and respectfully request that the Examiner reconsider and withdraw the rejection.

As for claims 20-26, the Examiner asserts that the methods for tuning an external cavity laser are considered product-by process steps. Applicants respectfully disagree. Specifically, applicants respectfully submit that claims 20-26 are process claims, which recite a method of operation (i.e., tuning an external cavity laser). Applicants respectfully submit further that neither reference cited by the Examiner anticipates claims 20-26 because neither reference

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teaches the subject matter of claim 20. Claims 21-26 properly depend from claim 20 and are patentable as well.

CONCLUSION

The Applicant submits that all grounds for rejection have been properly traversed. Therefore, the Applicant respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections and pass claims 1-30 to allowance. The Examiner is invited to telephone the undersigned representative if the Examiner believes that an interview might be useful for any reason.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 11/26/02

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VERSION OF SPECIFICATION WITH MARKINGS TO SHOW CHANGES

[0035] The external cavity laser 10 includes a grid generator element and a tunable element or channel selector, which are respectively shown in FIG. 1 as a grid etalon [26] 24 and a wedge etalon 26 positioned in an optical path 22 between gain medium 12 and end mirror 14. Grid etalon is positioned in optical path 22 before tunable element 26, and has parallel reflective faces 28, 30. Grid etalon 24 operates as an interference filter, and the refractive index of grid etalon 24 and the optical thickness of grid etalon 24 as defined by the spacing of faces 28, 30 give rise to a multiplicity of transmission maxima within the communication band at wavelengths which coincide with the center wavelengths of a selected wavelength grid which may comprise, for example, the ITU (International Telecommunications Union) grid. Other wavelength grids may alternatively be selected. Grid etalon 24 has a free spectral range (FSR) that corresponds to the spacing between the grid lines of the ITU grid, and the grid etalon 24 thus operates to provide a plurality of passbands centered on each of the gridlines of the wavelength grid. Grid etalon 24 has finesse (free spectral range divided by full width half maximum or FWHM) that suppresses neighboring modes of the external cavity laser between each channel of the wavelength grid, as discussed further below.

[0036] Grid etalon may be a parallel plate solid, liquid or gas spaced etalon, and may be tuned by precise dimensioning of the optical thickness between faces 28, 30 by thermal expansion and contraction via temperature control. The grid etalon 24 may alternatively be tuned by tilting to vary the optical thickness between faces 28, 30, by application of an electric field to an electro-optic etalon material, by changing the pressure of a gas spaced etalon, by inducing an index change in a nonlinear optical material with a second optical beam, or by changing the size of a spacer that determines the spacing in a gas or liquid filled etalon by thermal, piezoelectric, or micromechanical means. Grid etalon 24 alternatively may be actively tuned during laser operation as described in the U.S. Patent Application Ser. No. [_______] 09/900,474 entitled "External Cavity Laser with Continuous Tuning of Grid Generator" to inventor Andrew Daiber, co-filed herewith, and incorporated herein by reference.

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[0038] Wedge etalon 26 as shown in FIG. 1 is only one tunable element or channel selector that may be used in accordance with the invention in an external cavity laser, and various other types of channel selector may be used in place thereof, including grating, electro-optic, thin film and vernier tuning devices. The use of an air gap wedge etalon for channel selection is described in U.S. Patent No. 6,108,355, wherein the "wedge" is a tapered air gap defined by adjacent substrates. The use of pivotally adjustable grating devices as channel selectors tuned by grating angle adjustment and the use of an electro-optic tunable channel selector in an external cavity laser and tuned by selective application of voltage are described in U.S. Patent Application Ser. No. 09/814,646 to inventor Andrew Diaber and filed on March 21, 2001. The use of a translationally tuned graded thin film interference filter as a channel selector is described in U.S. Patent Application Ser. No. [______] <u>09/814,646</u> and in U.S. Patent Application Ser. No. 09/900,412 entitled "Graded Thin Film Wedge Interference Filter and Method of Use for Laser Tuning" to inventors Hopkins et al., co-filed herewith. The aforementioned disclosures are incorporated herein by reference.

[0046] The external cavity defined by end mirror 14 and output facet 18 is tunable by an external cavity tuner or drive mechanism 46. In the embodiment shown, external cavity drive 46 is operatively coupled to end mirror 14 and is configured to adjust the optical path length l of the external cavity by positionally adjusting end mirror 14. In other embodiments, the external cavity drive 46 may be operately coupled to gain medium 12 and configured to positionally adjust gain medium 12 to tune the external cavity or to thermally adjust the optical path length of the gain medium 12 to tune the external cavity. In still other embodiments, external cavity drive 46 may by electro-optic in nature and carry out adjustment of optical path length l by changing the effective optical thickness of an electro-optic tuner (not shown) in the external cavity, as described further below. Electro-optic tuning of an external cavity is disclosed in U.S. Patent Application Ser. No.[_______] <u>09/900,426</u> entitled "Evaluation and Adjustment of Laser Losses According to Voltage Across Gain Medium" to inventors Daiber et al., the disclosure of which is

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incorporated herein by reference. Various mechanisms for tuning the optical path length *l* may be used with the invention, and the wavelength tuning will be configured accordingly to provide adjustment of optical path length *l*.

[0047] In certain embodiments, external cavity drive 46 may comprise a thermally tunable compensator element (not shown) that is configured to position end mirror 14 by heating or cooling the thermal compensator element according to optical cavity adjustment signals from external cavity controller 48 to a thermoelectric controller (also not shown) coupled to the thermally tunable compensator element. The use of a thermally controlled tuning element to positionally adjust and end mirror and other optical components in an external cavity laser is also described in U.S. Patent Application Ser. No. 09/814,646 to inventor Andrew Daiber, filed on March 21, 2001, and in U.S. Patent Application Ser. No. [________] 09/900,443 entitled "Laser Apparatus with Active Thermal Tuning of External Cavity" to inventors Mark Rice et al., which is co-filed simultaneously herewith.

[0048] External cavity drive 46 is operatively coupled to an external cavity controller 48 which provides signals to control the positioning of end mirror 14 by external cavity drive 46. External cavity controller 46 may be operatively coupled to a voltage sensor 50, which in turn is operatively coupled to one of a pair of electrodes 52, 54 associated with gain medium 12. Electrodes 52, 54 provide a drive current to gain medium 12 from drive current source 56. Since optical feedback from end mirror 14 enters gain medium 12 through anti-reflection coated front facet 16, voltage across gain medium 12 as monitored by sensor 50 accurately indicates losses associated with the external cavity. External cavity controller 48 is configured to generate cavity mode signals from the output of voltage sensor 50, and to provide compensating signals to external cavity drive 46. The use of monitoring voltage modulation across a gain medium in an external cavity laser to evaluate external cavity losses and generate error signals there from is also described in U.S. Patent Application Ser. No. 09/900,426 entitled "Evaluation and Adjustment of Laser Losses According to Voltage Across Gain Medium" to inventors Daiber et al., the disclosure of which is incorporated herein by reference.

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[0049] External cavity controller 48 may alternatively, or additionally, include stored lookup tables of optical cavity tuning information that provides positions [correspond] corresponding to selectable optical path lengths *l*. External cavity controller 48 may be internal to external cavity drive 46, or may be external and shared in other component positioning and servo functions of the external cavity laser 10. External cavity controller 46 may, in certain instances, be embodied in the same controller device as wavelength controller 36 described above. An encoder [50] 60 may be included in association with external cavity drive 46 to ensure correct positioning or adjustment thereof by external cavity controller 48.

[0057] The passbands PB1 defined by the external cavity longitudinal modes are omitted from FIG. 3A-3C for reason of clarity. As discussed previously, the laser will lase on the cavity mode with the highest round trip transmission through the cavity. In FIG. 3A, passband PB2 has the greatest transmission, and a laser mode close to the peak of PB2 will have the greatest overall transmission through the external cavity. By placing a small dither or frequency modulation on the optical path length of the cavity, an error signal may be generated which usable to adjust the (mean) optical path length of the cavity so that the laser mode is locked to the peak of passband PB2 with the greatest transmission through passband PB3. It is also useful to place a small dither or frequency modulation on the location of passband PB3 to lock the peak of passband PB3 to the lasing mode, itself locked to a peak of passband PB2. The use of dither or modulation elements to introduce frequency modulation into laser components is described in U.S. Patent Application ser. No. [________] 09/900,426 entitled "Evalustion and Adjustment of Laser Losses According to Voltage Across Gain Medium" to inventors Daiber et al., noted above and incorporated herein by reference.

[0063] Equal changes in the length of actuators 62, 64 translate grating 60 along beam 22 to change the optical path length *l* (defined by grating 60 and gain medium facet 18) without tuning the grating 60 to affect wavelength. Changing the length of actuators 62, 64 with equal

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magnitudes but in opposite directions pivots grating 60 with respect to point 62 to change the tuning of grating 60 without changing the optical path length l of the external cavity. The tuning of the passband of grating 60 is [this] thus independent or uncoupled from tuning of the optical path length, and the tuning of the optical path length is likewise independent or uncoupled from the tuning of the passband of grating 60. This orthogonal tuning of the grating passband and cavity optical path length is achieved using the same actuators 62, 64 together, but in different ways to achieve the different tunings. A grid generator is not shown with the external cavity laser 58, but may be included therewith.

[0067] Second electro-optic tuning element 114 includes a layer 120 of lithium niobate or other electro-optic material positioned between transparent electrodes 122, 124. External cavity controller 116 is configured to apply an adjustable voltage to one of electrodes 122, 124, the other of which is suitably grounded. Second electro-optic tuning element 114 is configured such that adjustment of voltage across the electro-optic material of tuning element 114, while changing the effective optical thickness of tuning element 114, also adjusts the overall optical path length l across the external cavity (between diode facet 18 and end mirror 14). The use of an electro-optic element for external cavity tuning is also described in U.S. Patent Application Ser. No. [_______] 09/900,426 entitled "Evaluation and Adjustment of Laser Losses According to Voltage Across Gain Medium" to inventors Daiber et al., noted above and incorporated herein by reference.

[0069] The second electro-optic tuning element 116 may also be used to introduce a signal modulation in the form of a frequency dither into the optical path length l of the external cavity laser. The signal modulation may comprise, for example, a frequency modulation of about 20kHz. Modulation of the optical path length l via frequency dither introduced by element 116 produces intensity variations in the ouput power of external cavity laser 98 which are detectable by photodetector 118 (or by monitoring voltage across gain medium 12 due to optical feedback thereinto from the external cavity). These intensity variations will vary in magnitude and phase error according to alignment of an external cavity mode with the center wavelength of the

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passbands defined by electro-optic tuning element 100 and grid generator 24. In other words, the intensity variations and phase shift in the modulation signal provide and effective way to evaluate external cavity losses and develop corresponding error signals for the adjustment of external cavity optical path length. Thus, external cavity controller 116 derives error signals from the modulation introduced by the frequency either, and communicates compensation signals to external cavity controller 116, which correspondingly adjusts the voltage applied across electro-optic substrate 120 to tune or adjust the optical path length *l* by changing the refractive index of substrate 120. The use of modulation elements to introduce frequency modulation or dither into laser components is described in U. S. Patent Application Ser. No. [________] 09/900,426 entitled "Evaluation and Adjustment of Laser Losses According to Voltage Across Gain Medium" to inventors Daiber et al., noted above and incorporated herein by reference.

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VERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES

1. A laser including an external cavity, comprising:

(a) a channel selector tuner configured to tune said laser to a selected channel; and

(b) an external cavity tuner configured to tune said external cavity to a selected optical path length;

(c) said channel selector tuner independently operable with respect to said external cavity tuner.

2. The laser of claim 1, wherein:

(a) said channel selector tuner is operable according to a channel selection signal; and

(b) said external cavity is operable according to a cavity mode signal.

3. The laser of claim 2, wherein said channel selection signal is derived independently from said cavity mode signal.

4. The laser of claim 3, wherein:

(a) said channel selection signal is derived from channel selector tuning data in a look-up table; and

(b) said cavity mode signal is derived from a detector configured to measure external cavity loss associated with cavity optical path length.

5. The laser of claim 1, wherein:

(a) said channel selector tuner is operatively coupled to a first controller and operable according the channel selector tuning data in a look-up table; and

(b) said external cavity tuner is operatively coupled to a second controller and operable according to error signals derived from a detector configured to measure external cavity loss associated with cavity optical path length.

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6. (Amended) An external cavity laser apparatus, comprising:

(a) a wavelength tuning mechanism configured to select a transmission wavelength according to a wavelength selection signal; and

(b) an external cavity mode tuning mechanism configured to select a cavity optical path length according to a cavity mode signal;

(c) said wavelength tuning mechanism configured to operate independently from said cavity mode tuning mechanism.

7. The external cavity laser apparatus of claim 6, wherein said wavelength selection signal is derived independently from said cavity mode signal.

8. The external cavity laser apparatus of claim 7, wherein:

(a) said wavelength selection signal is acquired from wavelength selection data stored in a look-up table; and

(d) said cavity mode signal is derived from a detector configured to measure external cavity loss associated with cavity optical path length.

9. The external cavity laser apparatus of claim 6, wherein:

(a) said wavelength tuning mechanism is operatively coupled to a first controller and operable according to wavelength tuning data in a look-up table; and

(b) said external cavity tuning assembly is operatively coupled to a second controller and operable according to error signals derived from a detector configured to measure external cavity loss associated with cavity optical path length.

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10. An external cavity laser apparatus, comprising:

(a) a wavelength tuning element; and

(b) an external cavity mode tuning element;

(c) said wavelength tuning element configured to tune orthogonally with respect to said external cavity mode tuning element.

11. An external cavity laser apparatus, comprising:

(a) a wavelength tuning assembly; and

(b) an external cavity optical path length tuning assembly;

(c) said wavelength tuning assembly operable uncoupled from said

external

cavity optical path length tuning assembly.

12. An external cavity laser apparatus, comprising:

(a) a gain medium having first and second output facets, said gain medium emitting a coherent beam from said first output facet along an optical path;

(b) an end mirror located in said optical path, said end mirror and said second output facet defining an external cavity;

(c) a wavelength tuning element positioned in said optical path before said end mirror;

(d) a wavelength tuning assembly operatively coupled to said wavelength tuning element and configured to adjust said wavelength tuning element; and

(e) a cavity optical path length tuning assembly operatively coupled to said external cavity and configured to adjust said external cavity optical path length;

(f) said wavelength tuning assembly configured to operate independently from said cavity optical path length tuning assembly.

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13. The external cavity laser apparatus of claim 12, wherein:

(a) a wavelength tuning assembly operates according to a wavelength selection signal; and

(b) said cavity optical path length tuning assembly operates according to a cavity mode signal;

(e) said wavelength selection signal derived independently from said cavity mode signal.

14. (Amended) The external cavity laser apparatus of claim 13, wherein[,] said wavelength selection signal is derived from wavelength tuning data in a look-up table.

15. The external cavity laser apparatus of claim 13, wherein said cavity mode signal is an error signal derived from a detector configured to measure external cavity loss associated with cavity optical path length.

16. The external cavity laser apparatus of claim 15, wherein said detector comprises a voltage sensor configured measure voltage modulation across said gain medium.

17. The external cavity laser apparatus of claim 13, further comprising a modulation element, said modulation element operatively coupled to said external cavity and configured to introduce a modulation to said cavity optical path length, said modulation usable to derive said cavity error mode signal.

18. The external cavity laser apparatus of claim 13, wherein said cavity optical path length tuning assembly comprises a thermally tunable compensating member, said thermally tunable compensating member coupled to said end mirror.

19. The external cavity laser apparatus of claim 13, further comprising a grid generator positioned in said optical path.

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20. (Amended) A method for tuning an external cavity laser, comprising:

(a) tuning a channel selector with a first tuning element according to a first[,] wavelength selection signal; and

(b) tuning an external cavity optical path length with a second tuning element according to a second[,] cavity mode error signal;

(c) said tuning said channel selector carried out independently from said tuning said external cavity optical path length.

21. (Amended) The method of claim 20, wherein said first wavelength selection signal is derived
independently from said second[,] cavity mode signal.

22. The method of claim 20, wherein said tuning by said first tuning element is carried out substantially orthogonally with respect to said tuning by said second tuning element.

23. The method of claim 20, further comprising:

(a) controlling said first tuning element with a first controller; and

(c) controlling said second tuning element with a second controller.

24. (Amended) The method of claim 20, further comprising:

(a) deriving said first[,] wavelength selection signal from a stored look-up table of adjustment parameter data; and

(c) deriving said second[,] cavity mode error signal from output from a sensor configured to monitor external cavity loss associated with said external cavity optical path length.

25. (Amended) The method of claim 24, wherein said deriving said second[,] cavity mode error signal comprises monitoring voltage modulation across a gain medium associated with said external cavity.

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26. (Amended) The method of claim 24, wherein said deriving said second[,] cavity mode error signal comprises introducing a frequency modulation to said external cavity optical path length, said frequency modulation detectable by said sensor.

27. A laser apparatus, comprising:

(a) wavelength tuning means for adjusting a channel selector;

(d) external cavity tuning means for adjusting optical path length, and

(e) means for decoupling said wavelength tuning means from said external cavity tuning means.

28. The laser apparatus of claim 27, further comprising:

(a) means for deriving a wavelength selection signal for said wavelength tuning means; and

(b) means for deriving an optical path length signal for said external cavity tuning means;

(c) said wavelength signal deriving means operable independently from said
optical path length signal deriving means.

29. The laser apparatus of claim 27, wherein said wavelength tuning means comprises wavelength selection control means for actuating a channel selector according to signals derived from optical output of said laser.

30. The laser apparatus of claim 29, wherein said external cavity tuning means comprises external cavity control means for actuating a reflector according to signals derived from voltage monitored across a gain medium of said laser.

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